



**Connectware™**

**Hardware Reference Manual**

**Digi One™ EM**

© Digi International Inc. 2002. All Rights Reserved

The Digi logo is a registered trademark of Digi International, Inc.

Connectware and Digi One are trademarks of Digi International, Inc.

Information in this document is subject to change without notice and does not represent a commitment on the part of Digi International.

Digi provides this document “as is,” without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Digi may make improvements and/or changes in this manual or in the product(s) and/or the program(s) described in this manual at any time.

This product could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes may be incorporated in new editions of the publication.

# Contents

<b>Chapter 1</b>	Introduction	5
	About This Guide.....	5
	Introducing the Digi One EM .....	6
	Support Information.....	7
<b>Chapter 2</b>	About the Digi One EM	8
	Digi One EM Drawing.....	8
	Connectors: Power and Serial Interface (P4).....	9
	Connectors: Ethernet Interface (P1) .....	10
	Reset Switch .....	11
	LEDs .....	11
<b>Chapter 3</b>	About the Development Board	13
	Overview.....	13
	Cautions .....	13
	Development Board Illustration.....	14
	DB-9 Serial Interface (P1) .....	15
	Reset Switch (SW1).....	16
	Power Jack (P7) .....	17
	LEDs (CR4 - CR11) .....	18

<b>Chapter 4</b>	Sample Application: TTL Signals to EIA-232	19
<b>Appendix A</b>	Digi One EM Specifications	20
	Network Interfaces.....	20
	Serial Interface.....	20
	Data Rates (bps).....	20
	Modem Control.....	20
	Flow Control Options.....	20
	Environmental.....	20
	Power Requirements.....	20
	Mechanical.....	20
<b>Appendix B</b>	Digi One EM Certifications	21
	FCC Part 15 Class A.....	21
	ICES 003 Class A.....	22
	Product Safety.....	22

# ***Chapter 1* Introduction**

## **About This Guide**

### **Purpose**

The purpose of this guide is to enable developers to integrate the Digi One EM into other devices, enabling these devices to make use of the Digi One EM's rich networking features.

### **Audience**

This document is written for developers tasked with integrating Digi One EM device servers into other devices.

### **Scope**

This document provides the information required for electrical integration of the Digi One EM into another device. It does not address how to configure or administer the device server or how to write applications to use its functionality. These topics are covered in other documents in the library.

# Introducing the Digi One EM

## Product Overview

The Digi One EM is part of the Digi One Family of single port device servers that provide simple, reliable and cost-effective network connections for serial devices. The Digi One EM provides fully transparent serial device connectivity over industry-standard Ethernet connections and allows both equipment manufacturers and systems integrators to network-enable products at a fraction of the time and cost required to develop a custom solution. It is a highly flexible and compact single component solution with a robust on-board TCP/IP stack and 10/100 Base-T Ethernet support.

From medical systems to building control and industrial automation, in virtually any application where embedded serial connectivity over Ethernet is needed, the Digi One EM is the ideal choice, delivering high-performance functionality.

## Cautions

- To guard against damage to the Digi One EM due to electrostatic discharge (ESD), do not remove it from its protective packaging until you have been properly grounded. To ground yourself, put the wrist strap on (included in the package) and then attach the clip to a metal surface.
- Input voltage for the Digi One EM must be in the range of 5VDC to 9VDC.

## **Support Information**

To get help with a question or technical problem or to make comments and recommendations about our products or documentation, use the following contact information.

### **General**

Digi International  
11001 Bren Road East  
Minnetonka, MN 55343  
U.S.A  
[www.digi.com](http://www.digi.com)

### **Customer Service and Support**

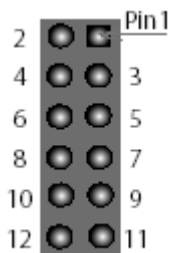
United States: 1 877-912-3444  
Other Locations: 1 952-912-3444  
[www.support.digi.com](http://www.support.digi.com)





## Connectors: Power and Serial Interface (P4)

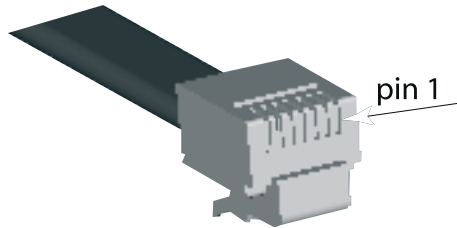
The Digi One EM has a single 12-pin, serial interface port (labeled P4) that supports EIA-232 (TTL levels only), data rates up to 230 Kbps and full-modem control. The following figure helps you locate pins, and the table helps you identify which signal uses each pin.



Pin	Signal Name	Description
1	+5VDC to +9VDC (input only)	Input power to Digi One EM
2	GND	Reference Ground for input power
3	RxD	Receive Data (input)
4	TxD	Transmit Data (output)
5	RTS	Request To Send
6	DTR	Data Terminal Ready
7	CTS	Clear To Send
8	DCD	Data Carrier Detect
9	DSR	Data Set Ready
10	RST~	Reset
11	Reserved	Not used
12	Reserved	Not used

## Connectors: Ethernet Interface (P1)

The Digi One EM Ethernet connector is an eight-wire, RJ-45 jack meeting the requirements of ISO 8877 for 10/100Base-T. The following figure helps you locate pins and the table helps you identify which signal uses each pin.



Pin	Signal Name
1	TxD+ (Transmit Data)
2	TxD- (Transmit Data)
3	RxD+ (Receive Data)
4	Not used
5	Not used
6	RxD- (Receive Data)
7	Not used
8	Not used

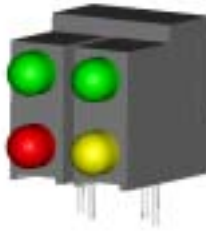
## Reset Switch

The reset switch, located between P3 and CR1, does the following (depending on how long you hold the switch down):

- It reboots the Digi One EM if you press and release the switch immediately.
- It reboots the Digi One EM and restores the configuration to factory defaults. (Press and hold the switch down for about 20 seconds while powering the Digi One EM up.)

## LEDs

Digi One EM LEDs provide information on port activity, diagnostics, and Ethernet activity.



LED	Color	Function	Interpretation
Top left	Green	Indicates serial port activity	<ul style="list-style-type: none"><li>• Off means that the serial channel is idle.</li><li>• Blinking indicates an active connection.</li></ul>
Top right	Green	Network link status	<ul style="list-style-type: none"><li>• Off means that no link has been detected.</li><li>• On means that a link has been detected.</li></ul>

LED	Color	Function	Interpretation
Bottom left	Red	Diagnostics	<ul style="list-style-type: none"> <li>• Blinking 1-1-1 means starting the operating system.</li> <li>• Blinking 1-5-1 means configuration has been returned to factory defaults.</li> <li>• Steady blinking means the device is seeking an IP address from a DHCP server.</li> </ul> <p><b>Note:</b> If other blinking patterns occur, call Digi Technical Support.</p>
Bottom right	Yellow	Reserved	NA

## **Chapter 3 About the Development Board**

### **Overview**

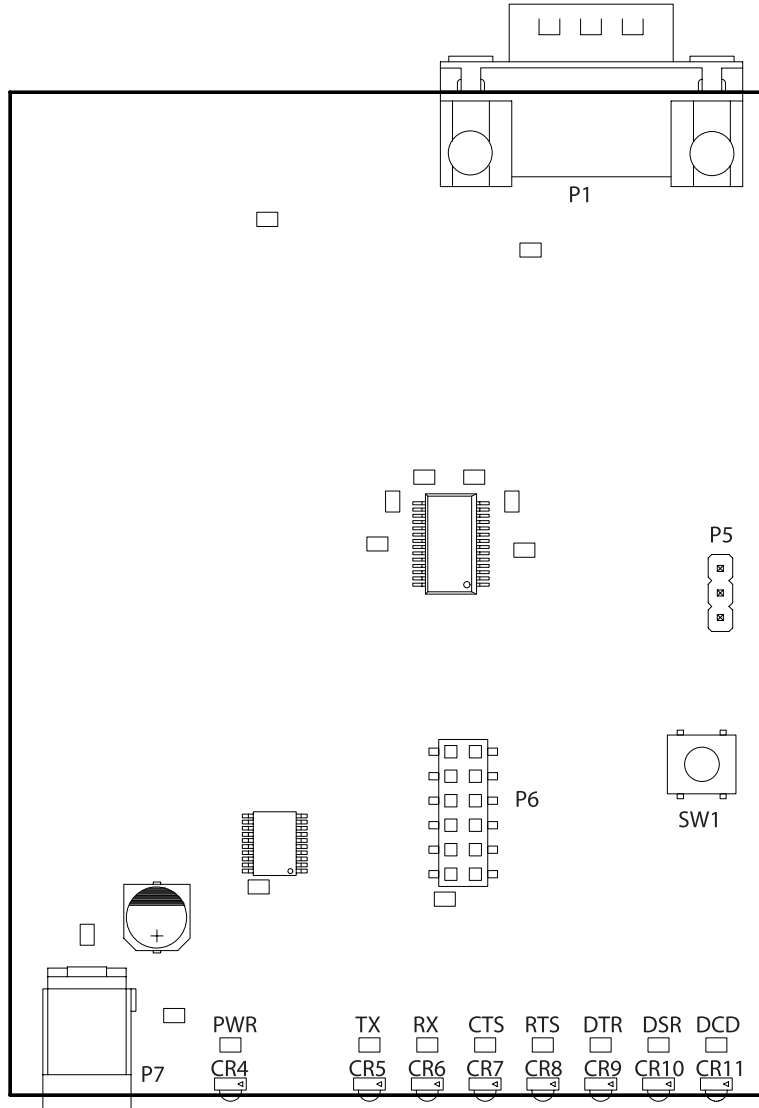
The development board provides the following interfaces:

- A DB-9 serial interface that enables serial connections from your device to the Digi One EM module. See "DB-9 Serial Interface (P1)" on page 15.
- A 12-position socket to supply both power and ground to the Digi One EM.
- A reset switch to reboot the Digi One EM. See "Reset Switch (SW1)" on page 16.
- A standard 2.0 mm jack that accepts 5 volts DC +/- 5% from a regulated power supply. See "Power Jack (P7)" on page 17.
- Eight LEDs. One (labeled CR4) tells you if the power is on. The other seven (labeled CR5 - CR11) are active when EIA-232 signals are detected. See "LEDs (CR4 - CR11)" on page 18.
- A reserved 3-pin header (labeled P5)

### **Cautions**

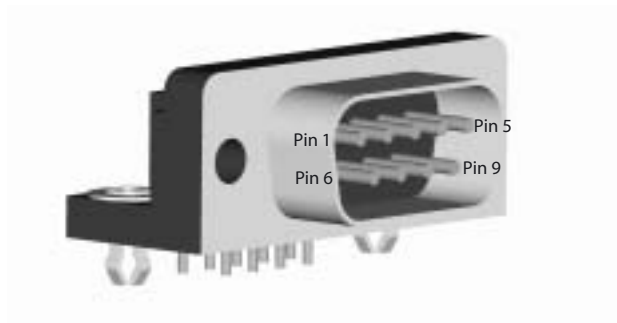
- Although the Digi One EM can handle up to 9 VDC, this voltage can harm the development board, which works only with the 5 volt regulated power supply. The board does not regulate power.
- To guard against damage to the development board due to electrostatic discharge (ESD), do not remove it from its protective packaging until you have been properly grounded. To ground yourself, put the wrist strap on (included in the package) and then attach the clip to a metal surface.

# Development Board Illustration



## DB-9 Serial Interface (P1)

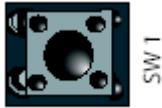
The following figure helps you locate specific DB-9 pins and the table maps signals to pins.



Pin	Signal
1	Data Carrier Detect (DCD)
2	Receive Data (RxD)
3	Transmit Data (TxD)
4	Data Terminal Ready (DTR)
5	Signal/Chassis Ground (GND)
6	Data Set Ready (DSR)
7	Request To Send (RTS)
8	Clear To Send (CTS)
9	Unused

## Reset Switch (SW1)

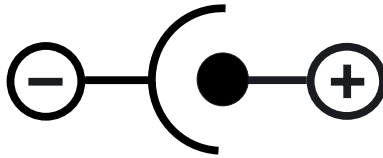
The reset switch reboots the Digi One EM.





## Power Jack (P7)

The power jack accepts 5 volts DC +/- 5% from a regulated power supply. The development board is polarity sensitive. The +5 volts is assumed to be the center contact on connector, and the ground is the outside of the connector barrel, as shown in the following figure.



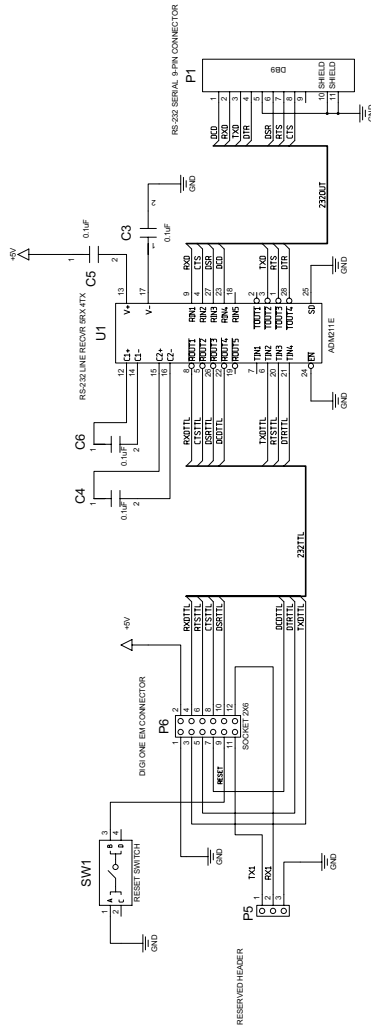
## LEDs (CR4 - CR11)

The LED labeled CR4 is a power indicator. The other seven LEDs display EIA-232 signal activity. The following table describes the specific signal associated with each LED.

LED	Signal
CR5	Tx (Transmit Data)
CR6	Rx (Receive Data)
CR7	CTS (Clear to Send)
CR8	RTS (Request to Send)
CR9	DTR (Data Terminal Ready)
CR10	DSR (Data Set Ready)
CR11	DCD (Data Carrier Detect)

# Chapter 4 Sample Application: TTL Signals to EIA-232

The following figure is an example of how to convert the Digi One EM signals to normal serial voltage levels.



# **Appendix A Digi One EM Specifications**

## **Network Interfaces**

- RJ-45 connector
- 10/100Base-T
- Half- and full-duplex support

## **Serial Interface**

One TTL EIA-232 serial interface

## **Data Rates (bps)**

110, 134, 150, 200, 300, 600, 1200, 2400, 3600, 4800, 9600, 19200, 38400, 57600, 115200, 230400

## **Modem Control**

DTR, DSR, DCD

## **Flow Control Options**

RTS/CTS, DTR/DSR, XON/XOFF, None

## **Environmental**

- Operating Temperature: 50 °F to 131 °F (10 °C to 55 °C)
- Humidity: 5% to 90%
- Altitude: 12,000 feet (3657.60 meters)

## **Power Requirements**

+5VDC @ 370 mA to 9VDC @ 230 mA typical

## **Mechanical**

- Length: 1.93 inches (49.02 millimeters)
- Width: 1.57 inches (39.87 millimeters)
- Height: 0.974 inches (24.73 millimeters)

## **Appendix B Digi One EM Certifications**

This product complies with the following standards:

### **FCC Part 15 Class A**

#### **Radio Frequency Interference (RFI) (FCC 15.105)**

This equipment has been tested and found to comply with the limits for Class A digital devices pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### **Labeling Requirements (FCC 15.19)**

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Modifications (FCC 15.21)**

Changes or modifications to this equipment not expressly approved by Digi may void the user's authority to operate this equipment.

**ICES 003 Class A**

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

**Product Safety**

- UL 60950
- EN60950
- CSA 22.2 No. 60950



